

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 February 2006 (02.02.2006)

PCT

(10) International Publication Number  
**WO 2006/011674 A1**

(51) International Patent Classification<sup>7</sup>: **G01S 17/36**,  
17/88

(21) International Application Number:  
PCT/JP2005/014268

(22) International Filing Date: 28 July 2005 (28.07.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2004-224480 30 July 2004 (30.07.2004) JP  
2004-250805 30 August 2004 (30.08.2004) JP  
2004-347713 30 November 2004 (30.11.2004) JP

(71) Applicant (for all designated States except US): **MATSUSHITA ELECTRIC WORKS, LTD.** [JP/JP]; 1048, Oaza-Kadoma, Kadoma-shi, Osaka 571-8686 (JP).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HAGIO, Kenichi** [JP/JP]; c/o Matsushita Electric Works, Ltd., 1048, Oaza-Kadoma, Kadoma-shi, Osaka 571-8686 (JP). **IKARI, Motoo** [JP/JP]; c/o Matsushita Electric Works, Ltd., 1048, Oaza-Kadoma, Kadoma-shi, Osaka 571-8686 (JP). **TAKADA, Yuji** [JP/JP]; c/o Matsushita Electric Works, Ltd., 1048, Oaza-Kadoma, Kadoma-shi, Osaka 571-8686 (JP). **HASHIMOTO, Yusuke** [JP/JP]; c/o Matsushita Electric Works, Ltd., 1048, Oaza-Kadoma,

Kadoma-shi, Osaka 571-8686 (JP). **TSUNESADA, Fumi** [JP/JP]; c/o Matsushita Electric Works, Ltd., 1048, Oaza-Kadoma, Kadoma-shi, Osaka 571-8686 (JP).

(74) Agents: **NISHIKAWA, Yoshikiyo** et al.; Hokuto Patent Attorneys Office, Umeda-Daiichiseimei Bldg. 5th Floor, 12-17, Umeda 1-chome, Kita-ku, Osaka-shi, Osaka 530-0001 (JP).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

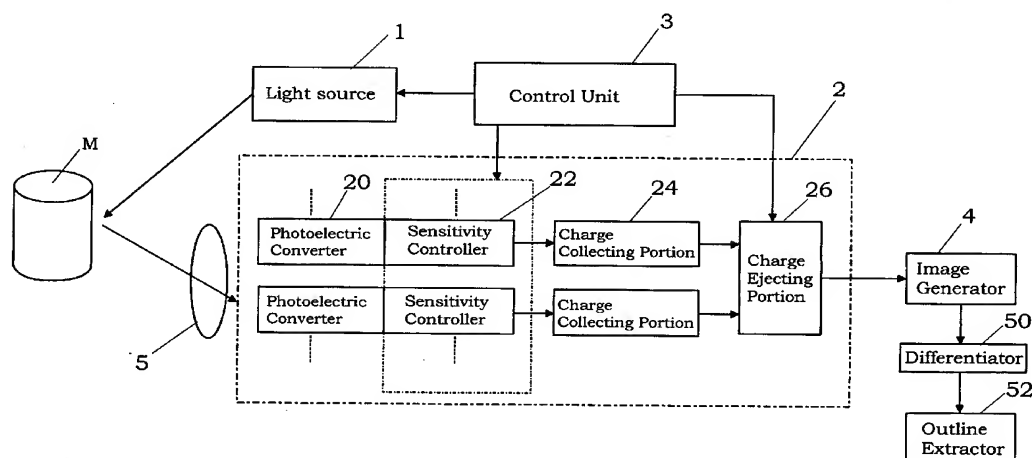
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: IMAGE PROCESSING DEVICE



(57) Abstract: An image processing device for generating both of a distance image and a gray image from an electrical output of a light receiving element on the precondition that a light intensity-modulated at a modulation frequency is irradiated into a target space. This device has an image generator for generating the distance image having pixel values, each of which provides a distance value between an object in the target space and the device, in accordance with a phase difference between the irradiated light and the received light, and the gray image having pixel values, each of which provides a gray value of the object, in accordance with an intensity of the received light. By use of an output of the image generator, an outline of the object can be extracted.

WO 2006/011674 A1



---

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*